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Solution by F. M. McGAW, A. M., Professor of Mathematics, Bordentown Military Institute, Bordentown, New Jersey, and the PROPOSER.

Let $M_aA_1=M_aA_2$, $A_2A_3=AH$, to prove A_3 on the circumference of the circle. Since A_2A_3 is a line through M , the center of the circle, the proposition is in effect to prove A_3 one extremity of the diameter through M_a .

By the conditions $AH=A_2A_3$, and is parallel to it, therefore AHA_3A_2 is a parallelogram.

Also triangles BHA and M_aMM_b are similar, hence since $2M_aM_b=AB$, we have $AH=2MM_a$.

$$\begin{aligned} \text{Therefore, } A_1A_3 &= A_2A_3 + A_2M_a + M_aA_1 \\ &= AH + 2M_aA_1 \\ &= 2M_aM + 2M_aA_1 \\ &= 2(MA_1) = 2r, \text{ hence } A_3 \text{ is extremity of diameter.} \end{aligned}$$

Q. E. D.

Also solved by CHAS. C. CROSS, and J. W. SCROGGS.

Mr. Cross furnished two different solutions.

72. Proposed by O. W. ANTHONY, M. Sc., Professor of Mathematics, Columbian University, Washington, D. C.

If a line with its extremities upon two curves move in any manner whatever, (the line may vary in length), and P a point upon the line which divides it in the ratio $m:n$ describe a curve, the area of this curve will be given by the formula—

$$A = \frac{(m^2 + nm)A_1 + (n^2 + mn)A_2 - mnA_3}{(m+n)^2}.$$

No solution of this problem has been received.

73. Proposed by ROBERT J. ALEY, A. M., Ph. D., Professor of Mathematics, Indiana University, Bloomington, Indiana.

Prove by pure geometry: (1) A' , B' , and C' are the middle points of the arcs BC , CA , and AB respectively. With these points as centers, circles are described passing through B and C , C and A , and A and B respectively. Prove that these circles intersect in O , the center of the incircle of the triangle ABC ; (2) that O , the center of the incircle, is Nagel's point of the triangle formed by joining the middle points of the sides.

Solution by CHARLES C. CROSS, Laytonsville, Maryland, and the PROPOSER.

(1) AO cuts the circumcircle at A' , for AO bisects angle A and also its subtending arc. $\not\propto OBA' = \frac{1}{2}(A+B)$.

$\not\propto BOA' = \frac{1}{2}(A+B)$ for it is exterior angle to triangle BOA .

\therefore triangle $A'BO$ is isosceles.

$A'B=A'O$. By similar reasoning it is proved that $B'A=B'O$ and $C'A=C'O$.

\therefore The circles intersect in O .

(2) It is a well known property of Nagel's point that AQ and OM_a , BQ and OM_b , CQ and OM_c are respectively parallel.

